

CLAIMS

1. Method for reducing the occurrence of shift cycling subsequent to exiting a two-clutch fixed-ratio mode in an electrically variable transmission including an input member and an output member, first and second clutches and first and second modes, said first mode characterized by simultaneous first clutch application and second clutch release, said second mode characterized by simultaneous first clutch release and second clutch application, said two-clutch fixed-ratio mode characterized by simultaneous first and second clutch applications wherein the transmission input member is mechanically coupled to the transmission output member through a fixed ratio, comprising:
 - providing a predetermined desired input member speed;
 - determining a synchronous speed for the input member whereat slip across first and second clutches is substantially zero;
 - incrementing a shift confidence factor as a function of a) the difference between the desired input member speed and the synchronous speed and b) the difference between the rate of change of the desired input member speed and the rate of change of the synchronous speed; and,
 - inhibiting the simultaneous application of said first and second clutches until said shift confidence factor attains a predetermined threshold.
2. The method for reducing the occurrence of shift cycling subsequent to exiting a two-clutch fixed-ratio mode as claimed in claim 1 wherein simultaneous application of said first and second clutches is inhibited until the first occurrence of one of a) said shift confidence factor attaining a predetermined threshold and b) a predetermined differential between the synchronous speed and the desired input member speed.
3. The method for reducing the occurrence of shift cycling subsequent to exiting a two-clutch fixed-ratio mode as claimed in claim 1 wherein simultaneous application of said first and second clutches is inhibited

until the first occurrence of one of a) said shift confidence factor attaining a
5 predetermined threshold and b) a predetermined duration of operation since
exiting the fixed-ratio mode.

4. The method for reducing the occurrence of shift cycling
subsequent to exiting a two-clutch fixed-ratio mode as claimed in claim 1
wherein simultaneous application of said first and second clutches is inhibited
until the first occurrence of one of a) said shift confidence factor attaining a
5 predetermined threshold, b) a predetermined differential between the
synchronous speed and the desired input member speed, and c) a
predetermined duration of operation since exiting the fixed-ratio mode.

5. The method for reducing the occurrence of shift cycling
subsequent to exiting a two-clutch fixed-ratio mode as claimed in claim 1
further comprising:
limiting the incrementing of the confidence factor as a function of
5 output member acceleration.

6. The method for reducing the occurrence of shift cycling
subsequent to exiting a two-clutch fixed-ratio mode as claimed in claim 1
wherein determining synchronous speed comprises:
measuring output member speed and multiplying said output
5 member speed by said fixed ratio.

7. The method for reducing the occurrence of shift cycling
subsequent to exiting a two-clutch fixed-ratio mode as claimed in claim 1
wherein the incrementing function is a non-linear function of the difference
between the desired input member speed and the synchronous speed and the
5 difference between the rate of change of the desired input member speed and
the rate of change of the synchronous speed.

8. Method for controlling an electrically variable transmission while in one of a first and a second mode, said transmission including an input member and an output member, first and second clutches, and first, second and fixed-ratio modes, said first mode characterized by simultaneous first
 5 clutch application and second clutch release, said second mode characterized by simultaneous first clutch release and second clutch application, said fixed-ratio mode characterized by simultaneous first and second clutch applications wherein the transmission input member is mechanically coupled to the transmission output member through a predetermined fixed ratio, comprising:
 10 providing a predetermined desired input member speed;
 determining a synchronous speed for the input member whereat slip across first and second clutches is substantially zero; and,
 inhibiting simultaneous application of first and second clutches in accordance with a predetermined relationship among proportional and
 15 derivative error quantities determined from said desired input member speed and said synchronous speed.

9. Method for controlling an electrically variable transmission as claimed in claim 8 wherein said predetermined relationship is contained in a look-up table of values dependent upon said proportional and derivative error quantities.

11. Method for controlling shifts out of one of a first and a second mode, said transmission including an input member and an output member, first and second clutches, said first mode characterized by simultaneous first clutch application and second clutch release, said second mode characterized
 5 by simultaneous first clutch release and second clutch application, and synchronous operation characterized by substantially zero slip across both first and second clutches, comprising:
 calculating a confidence factor indicative of the desirability of operating in an active one of the first and second modes;
 10 scheduling shifts out of the active mode; and,

inhibiting shifts out of the active mode as a function of the shift confidence factor.

12. The method for controlling shifts out of one of a first and a second mode as claimed in claim 11, further wherein said shift out of the active mode is inhibited until allowed by either the shift confidence factor or a predetermined level of off-synchronous operation.

13. The method for controlling shifts out of one of a first and a second mode as claimed in claim 11, further wherein said shift out of the active mode is inhibited until allowed by any of the shift confidence factor, a predetermined level of off-synchronous operation, or passage of a
5 predetermined duration since the active mode was activated.

14. The method for controlling shifts out of one of a first and a second mode as claimed in claim 11 wherein the confidence factor comprises a function of a) the difference between a desired input member speed and a synchronous speed for the input member whereat synchronous operation
5 occurs and b) the difference between the rate of change of the desired input member speed and the rate of change of the synchronous speed.

15. The method for controlling shifts out of one of a first and a second mode as claimed in claim 14 wherein the confidence factor further comprises a function of the time rate of change of an output member speed.